

There are several different approaches to increasing the capacity and reducing congestion on a roadway. In 1992, the Institute of Transportation Engineers (ITE) published a report entitled "A Toolbox for Alleviating Congestion." This publication lists proven strategies for dealing with traffic congestion. Following the format developed by ITE's Toolbox, the menu of options has been broken down into the categories of improved efficiency of the existing system, adding new capacity, transit service improvements, and transportation demand management. A detailed explanation of each strategy, and its effectiveness, is listed below.

## **Efficiency Improvements**

### Freeway Incident Management

Freeway incident management involves the pre-planned coordination of personnel, equipment, and materials with the goal of reducing incident detection, response, and clearance time. Incident management programs utilize various combinations of strategies and technologies in achieving this goal. Some of these strategies include: roving service vehicles, motorist aid call boxes, dedicated cellular phone lines, incident management teams, motorist information systems, traffic diversion techniques, and alternate route identification. Incident management technologies include traffic surveillance systems that incorporate mainline detectors, variable message signs, closed-circuit television, advanced communications systems, and highway advisory radios.

### Surveillance and Control Systems

These systems are designed to be demand responsive and change traffic control according to traffic volumes on roadways. Often surveillance and control systems combine ITS technologies with sophisticated signal timing packages used in conjunction with computerized signal systems. The latest software packages are capable of devising and implementing a customized timing plan for the site conditions.

### Motorist Information Systems

Variable message signs, highway advisory radio, or other technologies can be used to provide information to the motorist on congested routes, traffic incidents, roadway construction, or alternate routes helping them to anticipate and avoid congested locations.

### Ramp Metering

Ramp metering is the use of a modified traffic signal placed at the end of a ramp to allow traffic to enter the freeway either at pre-timed intervals or according to existing traffic volumes on the ramp or the highway. The merging traffic experiences increased delay; however, the mainline experiences an increase in speeds and a decrease in the number of accidents.

### Adding Lanes Without Widening

Reducing the lane width on existing lanes to provide an additional travel lane can increase the capacity of an existing facility. This solution is limited to facilities with existing wide travel